Practical No.9: Check the output of comparator circuit consists of Digital IC.

I Practical Significance

As data comparison is mostly required in many digital systems at the time of logical or arithmetic functions, digital comparators are the one best option to compare data. Digital comparators are the most appropriate combinational logic circuits used to compare relative magnitudes of two binary numbers.A comparator is a decision-making tool and it holds the ability to be executed in numerous control devices.

II Industry/Employer Expected Outcome(s)

Students will be able to test the functionality of the digital circuits/system.

III Course Level Learning Outcome(s)

Develop combinational logic circuits for given applications.

IV Laboratory Learning Outcome(s):

1. Build/Test 2 or 4 bit Magnitude comparator using Digital IC.

V Relevant Affective Domain related outcome(s)

Identify PIN configuration of IC.
Handle the components and equipment carefully.
Follow all safety precautions.

VI Relevant Theoretical Background

A magnitude digital Comparator is a combinational circuit that compares two digital or binary numbers in order to find out whether one binary number is equal, less than, or greater than the other binary number.

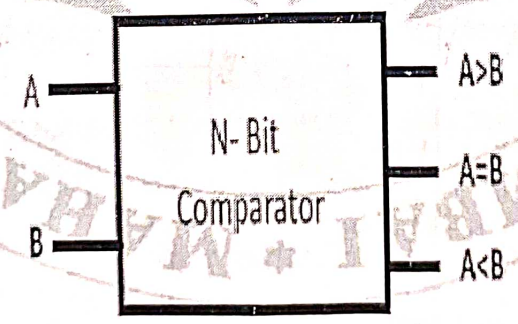


Fig.9.1 Comparator block diagram

Circuit have two inputs one for A and the other for B and have three output terminals, one for A > B condition, one for A = B condition, and one for A < B condition.

VII Circuit diagram

a) Sample circuit

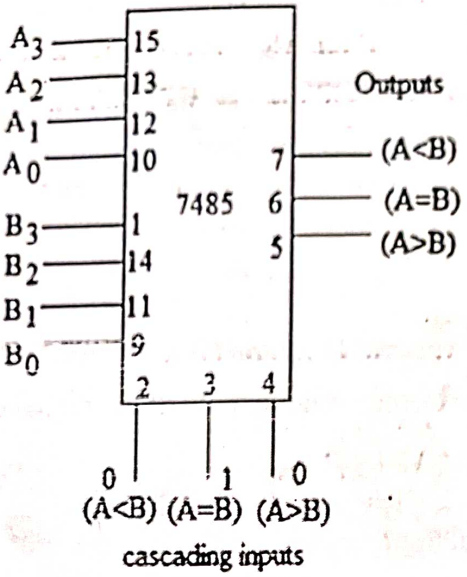
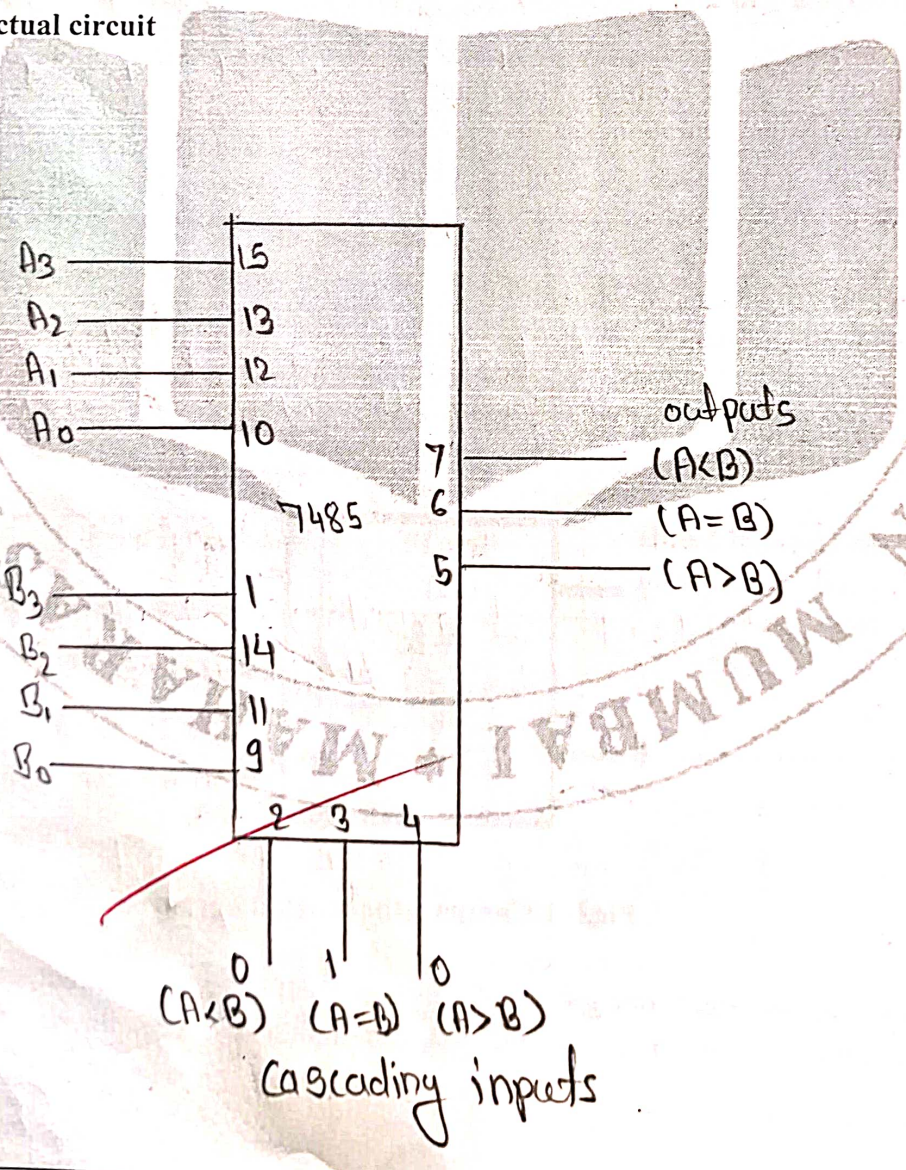


Fig 9.2: Circuit Diagram : 4 bit magnitude comparator

b) Actual circuit



VIII Resources Required

Sr. No.	Name of Resource	Suggested Broad Specification	Quantity
1	Digital Multimeter	Digital Multimeter: 3 1/2 digit display.	2
2	Digital IC Tester	Tests a wide range of Digital IC's such as 74 Series, 40/45 Series of CMOS IC's.	1
3	DC power supply	+5 V Fixed power supply	1
4	Breadboard	5.5cm X 17 cm	1
5	IC	7485	1
6	LED	Red /Yellow color 5 mm	1
7	Connecting wires	Single strand 0.6 mm Teflon coating	As required
8	Resistor	1KΩ/330Ω	As required

IX Precautions to be followed

1) Check IC before use.
2) Set power supply to 5V (Variable DC Power Supply) before connecting.
3) Check all the connections as per circuit diagram

X Procedure

1. Test the IC using Digital IC tester
2. Mount the IC on the breadboard
3. Make the connection as per fig 9.2.
4. Connect the +5V to +Vcc pin of IC and GND pin to ground
5. Observe the LED (on or off) for given combination of input as per truth table
6. Verify the truth table

XI Resources Used

Sr. No.	Name of Resource	Suggested Broad Specification	Quantity
1	Digital multimeter	3 1/2 digit display	2
2	Digital IC Tester	74 series, 4045	1
3	DC power Supply	+5V fixed Power	1
4	IC	7485	1
5	LED	Red/yellow color 5mm	1

XII Actual Procedure

1] Test the IC using Digital IC tester
2] mount the IC on the breadboard
3] connect the +5V to +Vcc pin of IC & GND pin to ground

XIII Observation:

Table 9.1: Observation Table

Input A				Input B				Output		
A_3	A_2	A_1	A_0	B_3	B_2	B_1	B_0	A<B	A=B	A>B
0	0	0	1	0	0	1	1	1	0	0
1	0	0	0	1	0	0	0	0	1	0
1	1	0	0	1	1	0	0	0	1	0
1	1	1	0	0	1	1	0	0	0	1
1	0	0	0	0	1	0	0	0	0	1
1	1	0	0	1	0	1	0	0	0	1
1	1	0	1	1	0	0	1	0	0	1
1	1	1	1	1	1	1	1	0	1	0

(Few sample input combinations are given above as 256 combinations of inputs are possible . Teacher can add 4 extra combinations for practice)

XIV Result(s)

In this Practical we Studied to check the output of Comparator circuit consist of Digital Ic

XV Interpretation of results

In this practical we learn to check the output of Comparator circuit consist of Digital Ic

XVI Conclusion and recommendation

Hence we Studied to check the output of Comparator circuit consist of Digital Ic

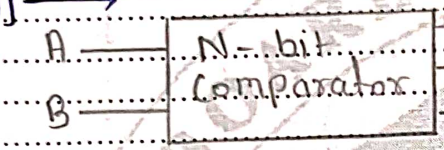
XVII Practical related questions

Note: Below given are a few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Draw logic circuit for 1 bit magnitude comparator also write its truth table
2. Draw pin diagram of IC 7485 also write its truth table.
3. List the name manufacture of IC 7485 & list any four electrical characteristics of it.

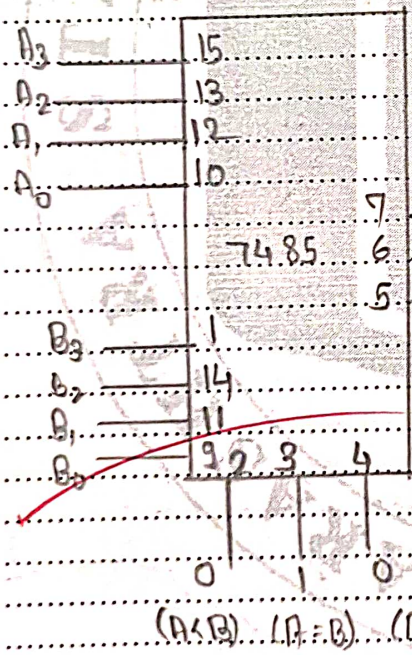
[Space for Answers]

1] →



A	B	A<B	A=B	A>B
0	0	0	1	0
0	1	1	0	0
1	0	0	0	1
1	1	0	1	0

2] →



A	B	A<B	A=B	A>B
0	0	0	1	0
0	1	1	0	0
1	0	0	0	1
1	1	0	1	0

3] →

- Manufactures of IC 7485:

1. Texas Instruments (TI)
2. ON Semiconductor
3. Nexperia
4. STMicroelectronics

5. Fairchild Semiconductor

• four electrical characteristics of IC 7485:

1] Supply Voltage (Vcc)
2] Input Voltage (VIH)
3] Low-level input Voltage (VIL)
4] Power Disscipation

XVIII References/Suggestions for further reading

1. https://dld-iitb.vlabs.ac.in/exp/four-bit-digital-comparator/index.html
2. https://www.nteinc.com/specs/7400to7499/pdf/nte7485.pdf

XIX Assessment Scheme

	Performance Indicators	Weightage
	Process Related : 15 Marks	**60 %**
1	Handling of the components	10%
2	identification of components	20%
3	Measuring value using suitable instrument	20%
4	working in teams	10%
	Product Related: 10 Marks	**40%**
5	Calculated theoretical values of given component	10%
6	Interpretation of result	05%
7	Conclusion	05%
8	Practical related questions	15%
9	Submitting the journal in time	05%
	Total (25 Marks)	**100 %**

Marks Obtained			Dated signature of Teacher
Process related (15)	Product related (10)	Total (25)	
14	10	24	